

### **AMENDMENTS TO THE SPECIFICATION**

The Following changes to the specification refers to the Substitute Specification filed on August 25, 2004.

Please amend the substitute specification on page 9 line 22 through page 10, line 7 as follows:

To achieve the object, the present invention provides a conductive roller including at least one conductive elastic layer. The conductive elastic layer formed of a polymer composition includes a main-component polymer not containing chlorine nor bromine and containing polyether or/and a ~~eyan~~ cyano group; and an anion-containing salt having a fluoro group and a sulfonyl group. The anion-containing salt having the fluoro group and the sulfonyl group includes at least one salt selected from among a salt of bisfluoroalkylsulfonylimide, a salt of fluoroalkylsulfonic acid, and a salt of tris (fluoroalkylsulfonyl) methide.

Please amend the substitute specification on page 11, line 13 through line 18 as follows:

The polymer not containing chlorine nor bromine contains the polyether or/and the polymer having the ~~eyan~~ cyano group. Thereby it is possible to stabilize cations generated by the dissociation from the salt and accelerate the dissociation of the salt. Thus the polymer composition is allowed to have a higher ionic conduction.

Please amend the substitute specification on page 13, line 10 through line 14 as follows:

The polymer containing the polyether or/and the ~~eyan~~ cyano group is contained in the polymer composition favorably at not less than 20 wt% nor more than 90 wt% and more favorably not less than 45 wt% nor more than 75 wt% of the entire polymer component of the polymer composition.

Please amend the substitute specification on page 13, line 15 through page 14, line 2 as follows:

If the polymer containing polyether or/and the ~~eyan~~ cyano group is contained in the polymer composition at less than 20 wt% of the entire polymer component, there is a fear that a sufficiently low electric resistance value cannot be obtained and that the polymer containing the polyether or/and the ~~eyan~~ cyano group is not uniformly dispersed and causes the electric resistance value to be nonuniform. On the other hand, if the polymer containing polyether or/and the ~~eyan~~ cyano group is contained in the polymer composition at more than 90 wt% of the entire polymer component, there is a fear that ozone cracking occurs and that the electric resistance value rises greatly when a voltage is successively applied to the conductive roller for a long time.

Please amend the substitute specification on page 14, line 3 through line 15 as follows:

The following polymers are preferable as the polymer containing the polyether: ethylene oxide-propylene oxide-allyl glycidyl ether copolymer, ethylene oxide-allyl glycidyl ether copolymer, propylene oxide-allyl glycidyl ether copolymer, ethylene oxide-propylene oxide copolymer, and urethane rubber. As the polymer having the ~~eyan~~ cyano group, the following ionic-conductive polymers are preferable: acrylonitrile butadiene rubber (NBR), hydrogenated acrylonitrile butadiene rubber, carboxyl-modified acrylonitrile butadiene rubber,

acrylonitrile butadiene isoprene terpolymer (NBIR), and liquid nitrile rubber. These polymers can be used singly or in combination. The polymer containing the polyether and the polymer having the ~~eyan~~ cyano group may be used in combination.

Please amend the substitute specification on page 14, line 16 through page 15, line 2 as follows:

By using the polymer containing the polyether or/and the ~~eyan~~ cyano group in combination with the low polar ozone-resistant rubber as the polymer not containing chlorine nor

bromine, it is possible to suppress variations in the electric resistance value and make the ozone-resistant property preferable. It is also possible to reduce the material cost because it is possible to reduce the use amount of the anion-containing salt having the fluoro group and the sulfonyl group. The weight ratio between the polymer containing the polyether or/and the ~~eyan~~ cyano group and the low polar ozone-resistant rubber is favorably 90:10 to 20:80 and more favorably 80:20 to 30:70 and most favorably 75:25 to 45:55.

Please amend the substitute specification on page 16, line 11 through line 18 as follows:

The polymer not containing chlorine nor bromine but containing polyether or/and a ~~eyan~~ cyano group and the anion-containing salt having the fluoro group and the sulfonyl group are added to the polymer component. As the polymer not containing chlorine nor bromine, the polymer composition contains the polymer containing the polyether or/and the ~~eyan~~ cyano group. Thereby the electrical performance of the conductive roller is optimized, as will be described below.

Please amend the substitute specification on page 25, line 9 through line 14 as follows:

The cations dissociated from the salt can be stabilized by the ~~eyan~~ cyano group contained in the NBR which is one of the main components of the rubber component of the conductive elastic layer. Thus the salt can be dispersed and dissolved uniformly in the in the polymer composition without using a medium.

Please amend the substitute specification on page 42, line 1 through line 12 as follows:

The conductive elastic layer 1 is formed of a polymer composition containing a polymer not containing chlorine nor bromine and an anion-containing salt having a fluoro group and a sulfonyl group. More specifically, a mixture of 70 parts by weight of acrylonitrile butadiene rubber, not containing chlorine nor bromine, which has a ~~eyan~~ cyano group and 30 parts by

weight of EPDM, not containing chlorine nor bromine, which is a low-polar ozone-resistant rubber is used as the polymer component. As the anion-containing salt having the fluoro group and the sulfonyl group,

lithium-bis (trifluoromethanesulfonyl) imide which is one of salts of bisfluoroalkylsulfonylimide is used.

Please amend the substitute specification on page 48, line 11 through line 25 as follows:

In addition to the above-described polymers not containing chlorine nor bromine, the following polymers containing the polyether can be used as the polymer not containing chlorine nor bromine: ethylene oxide-propylene oxide-allyl glycidyl ether copolymer, urethane rubber, and the like. As the polymer having the ~~eyan~~ cyano group, in addition to the NBR, it is possible to use, hydrogenated acrylonitrile butadiene rubber, carboxyl-modified acrylonitrile butadiene rubber, acrylonitrile butadiene isoprene terpolymer (NBIR), and liquid nitrile rubber. It is possible to select one or more ozone-resistant rubbers from among ethylene propylene rubber (EPM), styrene-butadiene copolymer rubber (SBR), butyl rubber (IIR), and silicone rubber (Q). The low polar ozone-resistant rubber may be mixed carbon black without the master batch.

Please amend the substitute specification on page 53, line 2 through line 22 as follows:

The conductive elastic layer was formed by using a polymer composition containing the polymer not containing chlorine nor bromine as its main component; and the anion-containing salt having the fluoro group and the sulfonyl group. As the polymer not containing chlorine nor bromine, the NBR having the ~~eyan~~ cyano group was used and the ethylene oxide-propylene oxide-allyl glycidyl ether terpolymer

(EO:PO:AGE=90:4:6) which is a polyether polymer and the EPDM which is a low-polar ozone-resistant rubber were used as necessary. Lithium-bis (trifluoromethanesulfonyl) imide was used as the anion-containing salt having the fluoro group and the sulfonyl group. The lithium-bis (trifluoromethanesulfonyl) imide was synthesized by the conventional method

described in Japanese Patent Application Laid-Open No. 2001-288193. The anion-containing salt having the fluoro group and the sulfonyl group was added to the polymer component without the intermediary of a medium, not fixed by crosslinking, which consists of the low molecular weight (not more than 10000) polyether compound or the low molecular weight polar compound. Other components shown in table 1 were used in the amount shown therein.

Please amend the substitute specification on page 54, line 7 through line 13 as follows:

As the polymer component, 100 parts by weight of the EPDM was used. The anion-containing salt having the fluoro group and the sulfonyl group was not used, but carbon black was used to obtain a necessary electric conduction. The polymer having the ~~eyan~~ cyano group was not used either. Other components shown in table 1 were used in the amount shown therein.

Please amend the substitute specification on page 54, line 21 through line 25 as follows:

As the polymer component, 100 parts by weight of the EPDM was used. The anion-containing salt having the fluoro group and the sulfonyl group was used. The polymer having the polyether or/and the ~~eyan~~ cyano group was not used. Other components shown in table 1 were used in the amount shown therein.

Please amend the substitute specification on page 60, line 15 through page 61, line 17 as follows:

As shown in tables 1 and 2, the conductive elastic layer of the conductive roller of the example 1 was composed of the polymer composition including the polymer not containing chlorine nor bromine and containing the ~~eyan~~ cyano group and the anion-containing salt, having the fluoro group and the sulfonyl group, added to the polymer. Therefore the conductive roller is allowed to have a low electric resistance value of  $10^{7.7} \Omega$  and a small peripheral nonuniformity value of 1.05, which indicates that the electric resistance of the conductive roller did not have variations in dependence on positions thereof. The conductive roller had a low extent of

environment-dependence ( $\Delta \log_{10}R$  is 1.0) in its electric resistance. Further the conductive roller had a low extent of dependence ( $\Delta \log_{10}R$  is 0.2) on voltage in its electric resistance. That is, the conductive roller had a stable electric resistance value despite variations in environment and voltage. In measurement of the initial drift, the ratio of the electric resistance value six seconds after the start time of the voltage application to the initial electric resistance value was 101%. That is, it was confirmed that the electric resistance value six seconds after the start time of voltage application could be made almost uniform. Further since the conductive roller 10 does not generate toxic smoke when it is burnt, it does not pollute environment because the conductive elastic layer does not contain chlorine nor bromine. It was confirmed that the conductive roller of each of the examples 2 through 5 had very high performance similarly to that of the example 1.

Please amend the substitute specification on page 64, line 8 through line 16 as follows:

In the polymer composition, as the polymer not containing chlorine nor bromine, the polymer containing the polyether or/and the ~~eyan~~ cyano group and the low polar ozone-resistant rubber is used in combination. Further the polymer composition contains carbon black. The carbon black is mixed with the low polar ozone-resistant rubber serving as the master batch for the carbon black. Thereby it is possible to obtain preferable processability and reduce the degree of dependence of the electric resistance value on environment.